

Intelligence in Relation to Height and Weight among Secondary School Students

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Abstract At present situation many questions have been arisen that intelligence is affected by various kind of factors such as height, weight and BMI etc. This study tries to explore the relation of intelligence in terms of height, weight and BMI. Here Cattell (1920) Culture Fair Test of Intelligence is used to measure intelligence and to find out the correlation of intelligence with height, weight and BMI in the field of rural and urban area students. The sample consists of 97 female and 112 male students from five secondary schools in Purulia district, West Bengal, India selected randomly. The study revealed that there is significant relationship exist between IQ and height and low significant relationship exist between IQ and weight and also no significant relationship exist between IQ and BMI.

Keywords: *intelligence, height, weight, IQ, t-test, ANOVA*

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1. Introduction

The growth and development of these children progress simultaneously and are influenced by different factors (Onis) [1]. Motor, emotional, social and cognitive developments are the different aspects of child development. Intelligence, measure of cognitive development is also influenced by nutritional factors that directly affect height and weight of the children (Tomchek & Lane) [2]. It is the mental ability that affects all sorts of mental activities, no matter what are the subject of the activity and its shape and no matter how difficult and marked by complexity and abstraction. It is the human ability but it differs from person to person and human can solve the problem with the help of this ability. Havighurst [3] have developed a theory of physical growth and cognitive development which explains that individual factors such as age, gender, disease/illness, and household factors such as economics, food consumption pattern, education, school environment, as well as other factors related to gene and hormone composition, influence the BMI and IQ of children. In our society, many rumors have been arisen which are non scientific, non practical concept, such as boys are more intelligent than girls or rural boys and girls are less intelligent than urban boys and girls. However, Ijaz et.al [4] conducted a study to explore the cultural differences in intelligence. Fagan and Holland [5] view that, cultural differences in providing of information may report for racial differences in IQ. Guo et.al. [6] indicated that rural and urban children were same in the means and range of scores and no cultural bias was found on Chinese Intelligence Scale for Young Children. There are rare studies related to the BMI and IQ of children in developing countries and especially in remote areas.

In view of the above, researchers tries to investigate following facts:

1. To know the difference between male IQ and female IQ.
2. Is the urban male & female are more intelligent than rural male & female?
3. To find out the relation of intelligence in terms of height and weight.
4. To find out the relation between intelligence and BMI.

2. Literature Review

Phan [7] conducted a study of adolescents (ages 14–18) seeking laparoscopic adjustable gastric banding surgery (BMI > 40) finds that their BMI is not at all associated with their intelligence, measured either by the Wechsler Intelligence Scale for Children (if the study participant is younger than 16) or the Wechsler Adult Intelligence Scale (if the study participant is 16 or older), despite the fact that 20.6% of the study participants had intelligence quotients (IQs) below 80 and none had IQs above 120. Ranabhat.et.al. [8] has investigated to determine the relationship between Body Mass Index (BMI) and IQ of students in two elementary schools in the Humla district of Nepal. The findings showed that BMI and IQ scores were significantly lower in the ultra-poor group. Economic status and parent education are still major determinants of IQ and BMI in these students. Tabriz et al. [9] studied the relationship between IQ and BMI in preschool children. Their findings showed that IQ and BMI possesses a significant relationship. Ijaz.et.al (2013) study to explore the cultural differences in intelligence. Result indicated that urban male students score high on non-verbal intelligence as compare to rural male students,

similarly urban female students comparatively score higher than rural female students. Kanazawa [10] studies conclude childhood intelligence has no direct effect on adult obesity but evolutionary psychological theories suggest otherwise. Result indicate that childhood general intelligence has a direct effect on adult BMI, obesity, and weight gain, net of education, earnings, mother's BMI, father's BMI, childhood social class, and sex. Kanazawa [10] studies a longitudinal study of sex differences in intelligence at ages 7, 11 and 16 years. Result indicates that at the ages of 7 and 11 girls obtained a higher average IQ than boys, but at the age of 16 years boys obtained a higher average IQ than girls. Liu and Lynn [11] indicated that Chinese males have high IQ as compared to females and samples from United States and Japan has different IQ. Kanazawa and Reyniers [12] study the role of height in the sex difference in intelligence. A sample of 80 high schools and 52 middle schools in the United States was selected to be representative with respect to region of country, urban city, school size, school type, and ethnicity. Studies found that both height and weight were positively correlated with intelligence.

3. Objectives of the Study

The study was conducted with the following objectives.

1. To know the difference between male and female with regard to IQ.
2. To know the significance difference between rural students and urban students with regard to IQ.
3. To know the significance interaction between gender and resident with regard to IQ
4. To find out the relation between intelligence and height.
5. To find out the relation between intelligence and weight.
6. To find out the relation between intelligence and BMI.

4. Hypotheses of the Study

A hypothesis is an assumption to be tested. The null hypotheses for the present study are as follows:

Ho₁: There is no significant difference exist between male and female IQ.

Ho₂: There is no significant difference exist between rural students and urban students with regard to IQ.

Ho₃: There is no significant interaction between gender and resident with regard to IQ.

Ho₄: There is no significant relation between IQ and weight.

Ho₅: There is no significant relation between IQ and height.

Ho₆: There is no significant relation between IQ and BMI

5. Population of the study

All the 9th standard students of secondary level of Purulia district, West Bengal (India) are the population of this study.

6. Sample and Sampling

Two blocks of Purulia district, WB were selected randomly. These are Purulia block-I, and Purulia block-II. The researchers selected 209 students randomly (boys 112 and girls 97). Here stratified random sampling technique was adopted. The sample profile is given in Table 1.

Table 1. Sample profile

	Urban	Rural	Total
Male	64	48	112
Female	64	33	97
Total	128	81	209

7. Tools of the Study

Following tools are used for the present study:

1. Cattell Culture fair test of intelligence.
2. Measurement tap for Height measurement and weight machine for weight measurement.

8. Procedure

At first five secondary schools of Purulia district (West Bengal, India) were randomly selected from each block. Then, researchers went to the selected schools for the data collection. For measuring IQ, researchers provided the intelligence scale to each student. The maximum 12 ½ minutes had been provided to each student as per instruction of the intelligence scale. There after researchers measure height and weight of each student. All subjects were asked to respond to the items and their responses were guaranteed to be confidential.

9. Analysis of the Data

9.1. Descriptive Statistics

Descriptive statistics help us to simply large amounts of data in a sensible way. Each descriptive statistic reduces lots of data into a simpler summary. Here we present our descriptive data (Table 2) in the form of Mean standard deviation (SD) and correlation along with 't' critical ratio.

Table 2. Showing mean and SD along with t- critical ratio

Pair of comparison	N	Mean	S.D	df	t-value
Male	112	83.12	16.33	207	4.27*
Female	97	74.84	10.60		
Rural	81	84.59	17.99	207	4.17*
Urban	128	76.32	10.63		
Rural male	48	93.22	16.07	79	6.98*
Rural female	33	70.63	11.18		
Urban male	64	75.62	11.53	126	0.73**
Urban female	64	77.01	9.68		
Urban female	64	77.01	9.68	95	2.91*
Rural female	33	70.63	11.18		
Urban male	64	75.62	11.53	110	6.45*
Rural male	48	93.22	16.07		

*Significance at 0.05 level, **Not significance at 0.05 level.

9.2. Inferential Statistics

Inferential statistics plays a pivotal role in hypothesis testing where it is used to determine if a null hypothesis can be rejected or retained. For the present study we have constructed a two way factorial design for the analysis of different variables (Table 3). Table 2 present the 't'-critical ratio which is also used to test different null hypotheses.

Table 3. Summary of multi ways ANOVA result

Source of variation	SS	df	MS	F ratio
A (Gender)	5546.393	1	5546.393	36.73
B (Residence)	1529.361	1	1529.361	10.29
A × B	6981.796	1	6981.796	47.07
Within group	30448.1	205	148.52	

9.3. Determination of Correlations and BMI

The correlation co-efficient of height, weight and BMI is given in Table 4. The BMI was calculated based on height and weight for age of the children by anthropometric measurement BMI is a function of both weight and height.

BMI = Weight in kg/height in meters squared.

Table 4. Determination of correlation values

Parameter	Height	Weight	BMI
IQ	0.424	0.349	0.100

10. Results and Discussion

10.1. Testing of Ho₁

The mean IQ scores for male is 83.12 (S.D= 16.33) and for female is 74.84 (S.D = 10.60) respectively. F- value (Table 3) for gender is found to be 36.73 which is significant at 0.01 level. Moreover 't'-value (Table 2) between male and female students is found 4.27 which is also significant at 0.01 level of significant. In view of the above H₀¹ is rejected. It means that there is significance difference exist between male and female students with regard to IQ. The result corroborates with the findings Rushton [13] and Liu and Lynn [11].

10.2. Testing of Ho₂

The mean scores of IQ for rural is 84.59 (S.D= 17.99) and for urban is 76.32 (S.D = 10.63) respectively. F- value (Table 3) for residence is found to be 10.29 which is significant at 0.01 level. Moreover 't'-value (Table 2) between rural and urban students is to be found 4.17 which is also significant at 0.01 level of significant. In view of the above H₀² is rejected. It implies that significance difference exist between rural and urban sector with respect to IQ.

10.3. Testing of Ho₃

An interaction occurs when the effect of one factor depends on the level of another. If an interaction is significant (p-value < .05), we conclude that the main effects are not independent of one another and that both effects are important. For this study F- value for the interaction of variables, gender and residence of the students (A × B)

was found to be 47.07 (Table 3) which is significant at 0.05 level. So, H₀³ is rejected. So, we have carried out further analysis by applying 't' test (Table 2) for different pairs. From Table 2 it is clear that out of four pairs three pair is found to be significant at 0.01 level and one pairs namely urban male and urban female is insignificant.

10.4. Testing of Ho₄

The value of co-efficient of correlation between height and IQ is found to be 0.424 (Table 4) which is higher than that of Table value which is significant at both the level. So we can say that there is significance relationship exist between IQ and height. Hence, Ho₄ is rejected. The result corroborates with the findings Kanazawa and Reyniers [12]. The large increases in average height, assumed to be due to improved nutrition, have been accompanied by an increase in brain size which may be one explanation for the Flynn effect [14].

10.5. Testing of Ho₅

The value of co-efficient of correlation between weight and IQ is found to be 0.329 (Table 4) which is higher than that of Table value which is significant at both the level. So we can say that there is significance relationship exist between IQ and weight. Hence, Ho₅ is rejected.

10.6. Testing of Ho₆

The correlation value between IQ and BMI is 0.100 (Table 4) which is lower than that of Table value. So we can say that there is no significance relationship exists between IQ and BMI. Here the Ho₆ is accepted. The finding corroborates with the finding of Phan et. al. [7].

11. Conclusion

On the basis of this research work, it was observed that the significant difference exist between male and female students with regard to intelligence. On the basis of this finding, we suggest to organize the education system equally for male and female students and give equal opportunity and also diversified curriculum should be framed for high intellectual students and special programmers and strategies should be launched to improve the poor ranking of IQ. On the other side the significant relation between IQ and weight and significant relation between IQ and height. Therefore we should measure height, weight and intelligence continuously and give them nutrient food and favorable environment should be provided to increase their height and weight.

References

- [1] Onis, M. (2006). Relationship between physical growth and motor development in the WHO child growth standards. *Acta Paediatr.* 95, 96-101.
- [2] Tomchek, S.D.; Lane, S.J. (1994). Full-term low birth weight infants: Etiology and developmental implications. *Phys. Occup. Ther. Pediatr.* 13, 43-65.
- [3] Havighurst, R.J. (1953). *Human Development and Education*; Longmans Green: New York, NY, USA.
- [4] Ijaz, Sidera., Farhana Kazmi, S., Nazir, Fozia. (2013). Culture as a Factor of Intelligence Among Secondary Level Students. *Pak. IOSR Journal of Research & Method in Education*, 1(4), 40-45.

- [5] Fagan, J. F., & Holland, C. R. (2007). Racial equality in intelligence: Predictions from a theory of intelligence as processing. *Intelligence*, 35(4), 319-334.
- [6] Guo, B., Aveyard, P., & Dai, X. (2009). The Chinese Intelligence Scale for Young Children Testing Factor Structure and Measurement Invariance Using the Framework of the Wechsler Intelligence Tests. *Educational and Psychological Measurement*, 69(3), 459-474.
- [7] Phan, T-LT, Curran JL, Datto GA. (2013). Evaluation of intelligence in an adolescent bariatric population. *Surg Obes Relat Dis.*, 9, 574-579.
- [8] Ranabhat, C., Kim, C., Park, M. B., Soo, K. C., Freidoony, L. (2016). Determinants of Body Mass Index and Intelligence Quotient of Elementary School Children in Mountain Area of Nepal: an Explorative Study. *Children*, 3, 3
- [9] Tabriz, AA., Sohrabi, MR., Parsay, S., Abadi, A; Kiapour, N., Aliyari, M., Ahmadi, F., and Roodaki, A. (2015). Relation of Intelligence Quotient and Body Mass Index in Preschool Children: A Community-Based Cross-Sectional Study, *Nutr Diabetes*. 5(8), 176.
- [10] Kanazawa, S. (2013). Childhood Intelligence and Adult Obesity, *Obesity*, 21 (3). 434-440.
- [11] Liu, J., & Lynn, R. (2011). Factor Structure and Sex Differences on the Wechsler Preschool and Primary Scale of Intelligence in China, Japan And United States, *Personality and Individual Differences*, 50(8), 1222-1226.
- [12] Kanazawa, S. and Reyniers, D. J. (2009). The Role of Height in the Sex Difference in Intelligence, *American Journal of Psychology*, 122 (4), 527-536.
- [13] Rushton, J. P. (1992). Cranial Capacity Related To Sex, Rank And Race In A Stratified Sample Of 6,325 U.S. Military Personnel. *Intelligence*, 16, 401-414.
- [14] Flynn J (2013). *Intelligence and Human Progress: The Story of what was Hidden in our Genes*, Elsevier.